

## PATENT ABSTRACTS OF JAPAN

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(54) **POLYESTER COMPOSITION AND MOLDING MADE FROM THE SAME**

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a polyester composition excellent in flavor retention and dimensional stability.

SOLUTION: The polyester composition comprises 100 pts.wt. (A) polyester consisting mainly of ethylene arylate repeating units and 0.01-100 pts.wt. (B) m-xylylene group-containing polyamide, wherein the molecular weight distribution (Mw/Mn) of the m-xylylene group-containing polyamide B satisfies formula (1):  $Mw/Mn \leq 2.5$  (wherein Mw is the weight-average molecular weight of the m-xylylene group-containing polyamide; and Mn is the number-average molecular weight thereof).

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**CLAIMS**

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[Claim(s)]

[Claim 1]Polyester (A) 100 weight section whose main repeating unit is ethylene arylate.

Meta-xylylene group content polyamide (B) 0.01 - 100 weight sections.

It is the polyester composition provided with the above, and molecular weight distribution (Mw/Mn) of this meta-xylylene group content polyamide (B) satisfies a following formula (1).

$Mw/Mn \leq 2.5$  ..... (1)

(Mw expresses weight average molecular weight of meta-xylylene group content polyamide among a formula (1), and Mn expresses a number average molecular weight of meta-xylylene group content polyamide.)

[Claim 2]The polyester composition according to claim 1, wherein the aforementioned meta-xylylene group content polyamide (B) satisfies a following formula (2).

$15000 \leq Mn \leq 30000$  ..... (2)

(Mn expresses a number average molecular weight of meta-xylylene group content polyamide among a formula (2).)

[Claim 3]The polyester composition according to claim 1 or 2, wherein sodium atom content in the aforementioned meta-xylylene group content polyamide (B) is within the limits which is 0.01-500 ppm.

[Claim 4]The polyester composition according to any one of claims 1 to 3, wherein an acetaldehyde content in the aforementioned polyester composition is 15 ppm or less.

[Claim 5]A Plastic solid which fabricates the polyester composition according to any one of claims 1 to 4, and is characterized by things.

[Claim 6]A Plastic solid, wherein the Plastic solid according to claim 5 is a blow molding object.

[Claim 7]A Plastic solid, wherein the Plastic solid according to claim 5 is a sheet like object.

[Claim 8]A Plastic solid, wherein the Plastic solid according to claim 5 is an oriented film which extends the sheet like object according to claim 7 in the at least 1 direction.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the Plastic solid excellent in the flavor holdout (\*\*\*\*\*: nature) which consists of the polyester composition and it which are suitably used as a raw material of the Plastic solid of blow molded containers including a bevel-use bottle, a film, a sheet, etc. When manufacturing a hollow container using the polyester composition of this invention, the mold goods which were excellent in dimensional stability can be obtained.

[0002]

[Description of the Prior Art] Since mechanical properties and chemical nature are excellent, both polyester, such as polyethylene terephthalate (it may be hereafter called PET for short), has high industrial value, and is widely used as textiles, a film, a sheet, a bottle, etc.

[0003] As a raw material of containers, such as a seasoning, an oil, a drink, cosmetics, and a detergent, various resin is adopted according to the kind of restoration contents, and its purpose of use.

[0004] Since polyester is excellent in a mechanical strength, heat resistance, transparency, and gas barrier property, it is [ among these ] especially the optimal as a raw material of the Plastic solid of the container for drink restoration, such as juice, a soft drink, and a carbonated drink, etc.

[0005] Supply such polyester to making machines, such as injection-molding machinery, and it fabricates preforming for hollow Plastic solids, for example, After inserting this preforming in the metallic mold of specified shape and carrying out stretch blow molding, it is common to heat-treat the drum section of a bottle (heat set), and for it to be fabricated by the blow molded container and to make the stopper part of a bottle heat-treat if needed further (stopper part crystallization).

[0006] However, PET contains acetaldehyde (it may be hereafter called AA for short) as a by-product at the time of melt polycondensation. When PET carries out thermoforming of the Plastic solid of a blow molding object etc., its acetaldehyde content in the construction material of the Plastic solid acquired by a pyrolysis generating acetaldehyde increases, and it affects flavors and smells, such as a drink with which the blow molding object etc. were filled up.

[0007] Therefore, various policies have been taken in order to reduce the acetaldehyde content in a polyester Plastic solid conventionally. How to reduce AA content by generally carrying out solid state polymerization of the polyester which carried out melt polycondensation, The method of making small shearing stress at the time of the method of reducing AA generation at the time of shaping using copolymerized polyester with the lower melting point, the method of making low molding temperature at the time of thermoforming as much as possible, and thermoforming

as much as possible, etc. are taken.

[0008]For example, to polyester resin 100 weight section, 0.05 or more weight sections of meta-xylylene group content polyamide resin, The method (JP,H6-6662,B) of using the polyester composition which added less than one weight section. Although the container made from polyester (JP,H4-71425,B) which consists of a polyester composition which made thermoplastic polyester contain the specific polyamide which regulated terminal amino group concentration in a certain range is proposed, It has turned out that it may be insufficient as a material of the container of low flavor bevel uses, such as mineral water.

[0009]Since heat resistance is required of the bottle for content fluid which needs heat restoration like a fruit-juice drink, Heat setting is carried out by carrying out blow molding within a hot blow mold about a bottle body etc., and, on the other hand, the technique of giving heat resistance is performed from the former by making it heat-treat and crystallize about a stopper part. In this case, the dimensional stability of the stopper part after crystallization treatment influences productivity greatly. When polyamide resin is added to polyester resin as mentioned above, it has turned out that the crystallization behavior of a polyester composition becomes unstable, and variation may occur in the size of a stopper part and it may become the fall of productivity. In particular, in recent years, molding speed has accelerated with highly-efficient-izing of a making machine, and the miniaturization of a bottle, and dimensional stability is posing a bigger problem from the field of productivity.

[0010]

[Problem(s) to be Solved by the Invention]Polyester (A) whose main repeating unit is ethylene terephthalate wholeheartedly as a result of examination in order that this invention persons may solve the problem of the aforementioned conventional technology, In the polyester composition which consists of meta-xylylene group content polyamide (B), it found out that the polyester composition excellent in flavor holdout and dimensional stability was obtained by specifying the molecular weight distribution (Mw/Mn) of meta-xylylene group content polyamide (B) in the specific range.

[0011]

[Means for Solving the Problem]In order to attain the above-mentioned purpose, a polyester composition of this invention, Polyester (A) 100 weight section whose main repeating unit is ethylene terephthalate, It is a polyester composition which consists of meta-xylylene group content polyamide (B) 0.01 - 100 weight sections, and is a polyester composition, wherein molecular weight distribution (Mw/Mn) of this meta-xylylene group content polyamide (B) satisfies a following formula (1).

$Mw/Mn \leq 2.5 \dots (1)$

(Mw expresses weight average molecular weight of meta-xylylene group content polyamide among a formula (1), and Mn expresses a number average molecular weight of meta-xylylene group content polyamide.)

[0012]In this case, the aforementioned meta-xylylene group content polyamide (B) can satisfy a following formula (2).

$15000 \leq Mn \leq 30000 \dots (2)$

(Mn expresses a number average molecular weight of meta-xylylene group content polyamide among a formula (2).)

[0013]In this case, sodium atom content in the aforementioned meta-xylylene group content polyamide (B) can be within the limits which is 0.01-1000 ppm. In this case, an acetaldehyde content in the aforementioned polyester composition can be 15 ppm or less.

[0014]In this case, it is a Plastic solid which a Plastic solid of this invention fabricates the above-mentioned polyester composition, and is characterized by things. In this case, a Plastic solid can be a blow molding object. In this case, a Plastic solid can be a sheet like object. In this case, a Plastic solid can be an oriented film which extends a sheet like object in the at least 1 direction.

[0015]

[Embodiment of the Invention]Hereafter, the embodiment of the Plastic solid which consists of a polyester composition of this invention and it is described concretely. Although a main repeating unit is polyester which is ethylene arylate, the polyester (A) used for this invention, desirable -- an ethylene arylate unit -- more than 85 mol % -- it is included linear polyester and they are more than 90 mol % and linear polyester included especially not less than 95% preferably still more preferably. Especially, polyethylene terephthalate and the polyethylene 2, and 6-naphthalate are preferred. It explains focusing on the case where it is polyester whose main repeating unit is the following and whose polyester (A) is ethylene terephthalate.

[0016]As dicarboxylic acid as a copolymer component used when said polyester is a copolymer, Isophthalic acid, 2,6-naphthalene dicarboxylic acid, diphenyl 4,4'-dicarboxylic acid, Aromatic dicarboxylic acid and its functional derivatives, such as difenoxycarboxylic acid, Aliphatic dicarboxylic acid, such as oxy acid, such as p-oxybenzoic acid and oxycaproic acid, and a functional derivative of those, adipic acid, sebacic acid, succinic acid, and glutaric acid, aliphatic dicarboxylic acid, such as the functional derivative and cyclohexanedicarboxylic acid, the functional derivative of those, etc. are mentioned.

[0017]As glycol as a copolymer component used when said polyester is a copolymer, Diethylene glycol, trimethylene glycol, tetramethylene glycol, Aromatic glycols, such as alkylene oxide adduct of alicyclic fellows glycols, such as aliphatic series glycols, such as neopentyl glycol, and cyclohexane dimethanol, bisphenol A, and bisphenol A, etc. are mentioned.

[0018]As a multifunctional compound as a copolymer component used when said polyester is a copolymer, as an acid component, trimellitic acid, pyromellitic acid, etc. can be mentioned and glycerin and pentaerythritol can be mentioned as a glycol component. The amount of the above copolymer component used must be a grade in which polyester maintains a line substantially. Copolymerization of a monofunctional compound, for example, benzoic acid, the naphthoic acid, etc. may be carried out.

[0019]After the aforementioned polyester's carrying out the direct reaction of the above-mentioned copolymer component by terephthalic acid, ethylene glycol, and necessity and distilling off and esterifying water, Direct esterification process which performs a polycondensation under decompression using one sort or the compound beyond it chosen from Sb compound, germanium compound, the Ti compound, or the aluminum compound as a polycondensation catalyst, Or after making the above-mentioned copolymer component react under existence of a transesterification catalyst by dimethyl terephthalate, ethylene glycol, and necessity and distilling off and carrying out the ester interchange of the methyl alcohol, It is manufactured by the ester interchange method for performing a polycondensation mainly under decompression using one sort or the compound beyond it chosen from Sb compound, germanium compound, the Ti compound, or the aluminum compound as a polycondensation catalyst. In order to increase the limiting viscosity of polyester furthermore and to reduce an acetaldehyde content, solid state polymerization may be performed.

[0020]A batch type reaction apparatus may perform aforementioned esterification reaction, ester exchange reaction, melt polycondensation reaction, and solid-state-polymerization reaction, and a continuous system reaction apparatus may perform again. Also in which method of these, a

melt polycondensation reaction may be performed in one step, and it may carry out by dividing into a multi stage story. A batch process device and a continuous system device can perform a solid-state-polymerization reaction like a melt polycondensation reaction. Melt polycondensation and solid state polymerization may be performed continuously, may be divided and may be performed.

[0021] As a Sb compound used for manufacture of the polyester (A) used for this invention, Antimonous oxide, antimony acetate, antimony tartrate, antimony tartrate potash, oxy-salts-ized antimony, antimony glycolate, antimony pentoxide, triphenylantimony, etc. are mentioned. Sb compound is added so that it may become the range of 50-250 ppm as Sb ullage in produced polymer.

[0022] As a germanium compound used for manufacture of the polyester (A) used for this invention, formless diacid-ized germanium, crystalline diacid-ized germanium, a germanium chloride, germaniumtetraethoxide, germanium tetra-n-butoxide, phosphorous acid germanium, etc. are mentioned. When using germanium compound, 5-150 ppm of the amount used [ 10-100 ppm of ] is 15-70 ppm still more preferably preferably as germanium ullage in polyester.

[0023] As a Ti compound used for manufacture of the polyester (A) used for this invention, Tetraethyl titanate, tetraisopropyl titanate, tetra-n-propyl titanate, Tetra alkyl titanate and those partial hydrolysates, such as tetra-n-butyl titanate, Oxalic acid titanyl compounds, such as oxalic acid titanyl, oxalic acid titanyl ammonium, oxalic acid titanyl sodium, oxalic acid titanyl potassium, oxalic acid titanyl calcium, and oxalic acid titanyl strontium, titanium trimellitic acid, titanium sulfate, a titanium chloride, etc. are mentioned. A Ti compound is added so that it may become the range of 0.1-10 ppm as Ti ullage in produced polymer.

[0024] As an aluminum compound used for manufacture of the polyester (A) used for this invention, Formic acid aluminum, aluminium acetate, propionic acid aluminum, Carboxylate, such as aluminum oxalate, an oxide, aluminium hydroxide, Inorganic acid salts, such as an aluminium chloride, aluminum hydroxychloride, and aluminum carbonate, Aluminum alkoxide, such as an aluminum METOKI side and aluminium ethoxyide, Organoaluminium compounds, these partial hydrolysates, etc., such as an aluminum chelate compound with aluminum acetylacetonate, aluminum acetyl acetate, etc., trimethylaluminum, and triethylaluminum, are raised. Aluminium acetate, an aluminium chloride, aluminium hydroxide, aluminium hydroxychloride, and especially aluminum acetylacetonate are [ among these ] preferred. An aluminum compound is added so that it may become the range of 5-200 ppm as aluminum ullage in produced polymer.

[0025] In the case of an aluminum compound, an alkali metal compound or an alkaline earth metal compound may be used together. Carboxylate, such as acetate of these elements, alkoxide, etc. are raised and an alkali metal compound or an alkaline earth metal compound is added by the system of reaction as a granular material, solution, an ethylene glycol solution, etc. An alkali metal compound or an alkaline earth metal compound is added so that it may become the range of 1-50 ppm as ullage of these elements in produced polymer.

[0026] The aforementioned catalyst compound can be added in the arbitrary stages of the aforementioned polyester formation reaction process. Various phosphorus compounds can be used as stabilizer. As phosphorus compounds used by this invention, phosphoric acid, phosphorous acid, phosphonic acid, those derivatives, etc. are mentioned. As an example, phosphoric acid, trimethyl phosphate ester, phosphoric acid triethyl ester, Tributyl phosphate ester, phosphoric acid triphenyl ester, phosphoric acid monomethyl ester, Phosphodimethyl ester, phosphoric acid monobutyl ester, dibutyl phosphate ester, Phosphorous acid, phosphorous acid

trimethyl ester, phosphorous acid triethyl ester, Phosphorous acid tributyl ester, methylphosphonic acid, methylphosphonic acid dimethyl ester, It is dimethylethylphosphonate, Feni -\*\*\*\* Suchon acid dimethyl ester, Feni -\*\*\*\* Suchon acid diethyl ester, Feni -\*\*\*\* Suchon acid diphenyl ester, etc., and these may be used alone and may use two or more sorts together. Phosphorus compounds are added in the arbitrary stages of the aforementioned polyester formation reaction process so that it may become the range of 5-100 ppm as Lynn ullage in produced polymer.

[0027]The limiting viscosity of the polyester (A) used for this invention, 0.55-1.30 deciliters [ g ] /and a minimum more preferably [ it is desirable and ] 0.58 deciliter/g. It is still more desirable, 0.60 deciliter [ g ] /and a maximum are more preferred, and 1.10 deciliters /are [ g ] the range of 0.90 deciliter/g still more preferably. The mechanical property of the Plastic solid etc. in which limiting viscosity was obtained by g in less than 0.55 deciliter /is sometimes bad. When exceeding g in 1.30 deciliters /, resin temperature may become high at the time of melting by a making machine etc., a pyrolysis may become intense, and the problem of the low molecular weight compound of the isolation which has on a smell retaining property increasing, or a Plastic solid coloring it yellow may arise.

[0028]Any, such as a cylinder type, a square shape, and tabular [ spherical or flat ], may be sufficient as the shape of the chip of the polyester (A) used for this invention. The range of the mean particle diameter is 1.3-5 mm usually 1.6-4.0 mm still more preferably 1.5-4.5 mm preferably. For example, it is practical that length is 1.3-4 mm in a cylinder type case, and a path is about 1.3-4 mm. In the case of a spherical particle, it is practical that the diameter of grain of maximum size is 1.1 to 2.0 times of mean particle diameter, and the minimum particle diameter is 0.7 or more times of mean particle diameter. The weight of a chip has the practical range of 10-30mg/piece.

[0029]the density of the polyester (A) used for this invention -- 1.33-1.43g/cm<sup>3</sup> -- it is the range of 1.37 - 1.42 g/cm<sup>3</sup> preferably.

[0030]Generally FAIN as the chip of polyester with same copolymer component and this copolymer component content that are generated in a manufacturing process is in polyester by remarkable \*\*\*\*\*. In having the character to promote crystallization of such fine \*\* polyester and existing so much, The problem of the transparency of the Plastic solid fabricated from such polyester being unable to get very bad, and the shrinkage amount at the time of bottle mouth plug part crystallization not falling within the range of default value, but it becoming impossible to seal with a cap in the case of a bottle arises.

[0031]Therefore, as for the content of FAIN in the polyester (A) used for this invention, 300 ppm or less are preferably desirable 500 ppm or less. When content exceeds 500 ppm, a crystallization rate early. For example, crystallization of the stopper part of a blow molded container becomes excessive, for this reason, the shrinkage amount of a stopper part may not fall within the range of default value, but the leakage of contents may arise, and the preforming object for blow molding may milk [ capping of a stopper part may become poor, ], and, for this reason, normal extension may become impossible.

[0032]The meta-xylylene group content polyamide (B) used for this invention, At least the constitutional unit generated from meta-xylylene diamine or meta-xylylene diamine, mixed xylylene diamine containing 30% or less of PARAKI silylenediamine of the whole quantity, and dicarboxylic acid in a chain More than 70 mol %. further -- desirable -- more than 75 mol % -- especially -- desirable -- more than 80 mol % -- it is the contained polyamide resin.

[0033]As dicarboxylic acid as a copolymer component, adipic acid, sebacic acid, Malonic acid,

succinic acid, glutaric acid, pimelic acid, SUPERIN acid, azelaic acid, Aliphatic dicarboxylic acid, such as undecanoic acid, undecadione acid, dodecane dione acid, and dimer acid, Aromatic dicarboxylic acid, such as alicyclic dicarboxylic acid, such as 1,4-cyclohexanedicarboxylic acid, terephthalic acid, isophthalic acid, orthophthalic acid, xylylene dicarboxylic acid, and naphthalene dicarboxylic acid, can be used.

[0034]As a diamine component as a copolymer component, Ethylenediamine, 1-methyl ethylenediamine, 1,3-propylenediamine, A tetramethylenediamine, pentamethylene diamine, hexamethylenediamine, Heptamethylene diamine, octamethylenediamine, nonamethylene diamine, Aliphatic diamine, such as decamethylene diamine, undecamethylene diamine, and dodecamethylenediamine. Alicyclic diamine, such as a cyclohexanediamine and bis-(4,4'-aminohexyl)methane, and the aromatic diamine like Paller bis-(2-aminoethyl) benzene can be used. These dicarboxylic acid and diamine can be used even if it combines one sort or two sorts or more at an arbitrary rate.

[0035]Aromatic aminocarboxylic acid like aminocarboxylic acid, such as lactam, such as epsilon caprolactam and RAURO lactam, aminocaproic acid, and aminoundecanoic acid, and \*\*\*\*-aminomethyl benzoic acid, etc. can be used as a copolymer component besides the above, diamine, and dicarboxylic acid. Use of epsilon caprolactam is especially desirable.

[0036]As an example of these polymers, polymetaxylene adipamide, polymetaxylene SEBAKAMIDO, A homopolymer, and meta-xylylene diamine / adipic acid / isophthalate copolymers, such as polymetaxylene SUPERAMIDO, The meta-xylylene / PARAKI silylene adipamide copolymer, meta-xylylene diamine / adipic acid / terephthalic acid copolymer, Meta-xylylene diamine / hexamethylenediamine / adipic acid copolymer, Meta-xylylene diamine / hexamethylenediamine / terephthalic acid copolymer, Meta-xylylene diamine / hexamethylenediamine / isophthalate copolymer, the meta-xylylene / PARAKI silylene PIPERAMIDO copolymer, meta-xylylene / PARAKI silylene AZERAMIDO copolymer, etc. are mentioned.

[0037]the molecular weight distribution (Mw/Mn) of the meta-xylylene group content polyamide (B) used for this invention -- following formula (1)

$Mw/Mn \leq 2.5$  ..... (1)

(Mw expresses the weight average molecular weight of meta-xylylene group content polyamide among a formula (1), and Mn expresses the number average molecular weight of meta-xylylene group content polyamide.) -- it is preferred that it is satisfied. A more desirable maximum is 2.4 and a still more desirable maximum is 2.3. Since the crystallization behavior of the mold goods obtained from the polyester composition of this invention will become unstable and variation will occur in a size if molecular weight distribution is larger than 2.5, productivity may fall.

[0038]The number average molecular weight (Mn) of the meta-xylylene group content polyamide (B) used for this invention is a following formula (2).

$15000 \leq Mn \leq 30000$  ..... (2)

It is preferred that it is in \*\*\*\*\*. The minimum of a more desirable number average molecular weight is 16000, and a still more desirable minimum is 17000. The maximum of a more desirable number average molecular weight is 29000, and a still more desirable minimum is 28000.

[0039]If the number average molecular weight of meta-xylylene group content polyamide (B) is smaller than 15000, it becomes easy to be tinged [ a Plastic solid ] with the yellow taste, and the mechanical strength of the Plastic solid acquired from the polyester composition of this invention not only may fall, but it may become scarce at product value. The flavor maintenance of the



blow molding object which will be acquired from the polyester composition of this invention on the other hand if the number average molecular weight of meta-xylylene group content polyamide (B) is larger than 30000 may become scarce, and may be lacking in practicality as a beverage container for low flavors.

[0040]As for a with a number average molecular weight [ in the meta-xylylene group content polyamide (B) used for this invention ] of 2000 or less line oligomer content, it is preferred that it is 3.0% or less. A more desirable maximum is 2.9% and a still more desirable maximum is 2.8%. If there are more with a number average molecular weight [ in meta-xylylene group content polyamide (B) ] of 2000 or less line oligomer contents than 3.0%, The transparency of the blow molding object etc. which it not only affects the flavor and smell of a drink with which the blow molding object etc. which were acquired from the polyester composition of this invention were filled up, but were acquired by oligomer adhesion on the heating mold surface increasing rapidly depending on heat-treatment conditions may get worse dramatically.

[0041]As for the sodium atom content in the meta-xylylene group content polyamide (B) used for this invention, it is preferred that it is within the limits of 0.01-500 ppm. A minimum is 0.1 ppm more preferably and is 1.0 ppm still more preferably. A maximum is 480 ppm more preferably and is 450 ppm still more preferably. If there is less sodium atom content in meta-xylylene group content polyamide (B) than 0.01 ppm, when gelling advances easily, becomes and manufactures a heat-resistant blow molding object using a polyester composition so that it may mention later, it will be easy to generate non-melt. If there is more sodium atom content in meta-xylylene group content polyamide (B) than 500 ppm, the mechanical strength of the Plastic solid the transparency of the Plastic solid acquired from a polyester composition not only becomes scarce, but acquired by the molecular weight fall of a polyester composition taking place may fall.

[0042]The sodium atom content in the meta-xylylene group content polyamide (B) used for this invention An atomic absorption method, It asks with emission spectrometry, inductively-coupled-plasma (it carries out abbreviated to ICP hereafter) emission spectrometry, an ICP mass analysis, X-ray fluorescence analysis, etc., and can use properly with sodium atom concentration.

[0043]The relative viscosity of the meta-xylylene group content polyamide (B) used for this invention, 1.3-4.0 are preferred -- a minimum -- more -- desirable -- 1.6 -- further -- desirable -- 1.7 -- it is 1.8 especially preferably -- a maximum -- more -- desirable -- 3.7 -- further -- desirable -- 3.5 -- it is 3.0 especially preferably. Relative viscosity may be inferior to the mechanical properties of the Plastic solid which a molecular weight is too small at 1.3 or less, and consists of a polyester composition of this invention. Conversely, or more by 4.0, the polymerization of said polyamide may take a long time to relative viscosity and it not only may cause degradation of polymer and coloring which is not preferred, but productivity may fall and it may become a cost hike factor.

[0044]The terminal group concentration of the meta-xylylene group content polyamide (B) used for this invention is a following formula (4).

$$AEG/CEG \geq 1.0 \dots (4)$$

AEG expresses the terminal amino group concentration (mmol/g) of meta-xylylene group content polyamide among (formula (4)), and CEG expresses the terminal carboxyl group concentration (mmol/g) of meta-xylylene group content polyamide. It is preferred that it is a range which is). more -- desirable --  $AEG/CEG \geq 1.5$  -- it is  $AEG/CEG \geq 2.0$  still more preferably. If the ratio (AEG/CEG) of terminal amino group concentration to the terminal carboxyl group concentration in meta-xylylene group content polyamide is smaller than 1.0, The

flavor maintenance of the blow molding object acquired from the polyester composition of this invention may become scarce, and may be lacking in practicality as a beverage container for low flavors.

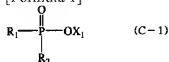
[0045] The aforementioned meta-xylylene group content polyamide heats the solution of diamine and the aminocarboxylate generated from dicarboxylic acid under application of pressure and ordinary pressure. The method of carrying out a polycondensation by a molten state or diamine, and dicarboxylic acid can be heated removing the water produced in water and a polycondensation reaction, and it can manufacture by the method of carrying out a direct reaction and carrying out a polycondensation under ordinary pressure, by a molten state, etc. By adding diamine superfluously to dicarboxylic acid, especially the meta-xylylene group content polyamide used for this invention can control molecular weight distribution within the limits of this invention, and can adjust terminal group concentration. As a concrete method, diamine and the aminocarboxylate generated from dicarboxylic acid can be manufactured by adjusting to the range of PH value = 7.52\*0.5. Hyperviscous meta-xylylene group content polyamide can be further obtained by carrying out solid state polymerization of the chip of said polyamide obtained by these melt polycondensation reactions. A batch type reaction apparatus may perform the polycondensation reaction of the aforementioned meta-xylylene group content polyamide, and a continuous system reaction apparatus may perform it again.

[0046] Usually, in the case of manufacture of meta-xylylene group content polyamide (B), in order to prevent the gelling by heat deterioration, stabilizer of the Lynn system is added and it polymerizes in many cases. When phosphorus atom content in the meta-xylylene group content polyamide (B) used for this invention is set to X, it is preferred that it is the range of  $0.01 \leq X \leq 400$  ppm. A minimum is 0.1 ppm more preferably, is 1 ppm further more preferably, is 3 ppm especially preferably, and is 5 ppm most preferably. A maximum is 380 ppm preferably and is 350 ppm still more preferably. If there is less X than 0.01 ppm, it will be burned when manufacturing a heat-resistant blow molding object using a polyester composition, and will be easy to generate \*\*\*\* and non-melt. The heat deterioration at the time of a fabricating operation is also large, and cannot find out the effect as stabilizer. On the other hand, although thermal stability is excellent when there is more X than 400 ppm, the transparency of the acquired blow molding object may worsen. The black considered to originate in the metal Sb when it adds to PET which used Sb system compound for the polymerization catalyst or the additive agent especially -- finishing -- it may produce and transparency may get remarkably bad.

[0047] It is preferred to use at least one chosen from the compound expressed with following-chemical-formula (C-1) - (C-4) as a compound containing the phosphorus atom in the above and meta-xylylene group content polyamide (B).

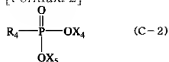
[0048]

[Formula 1]



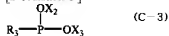
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[Formula 2]



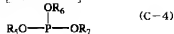
[0050]

[Formula 3]



[0051]

[Formula 4]



[0052] however, R<sub>1</sub> - R<sub>7</sub> -- hydrogen, an alkyl group, an aryl group, a cycloalkyl group, or an arylated alkyl group. Among hydrogen, an alkyl group, an aryl group, a cycloalkyl group, an arylated alkyl group, an alkaline metal or X<sub>1</sub> in each formula - X<sub>5</sub>, R<sub>1</sub> - R<sub>7</sub>, X<sub>1</sub> - X<sub>5</sub> may connect one piece mutually, and may form a ring structure, respectively. [0053] As a phosphinic acid compound expressed with a chemical formula (C-1), they are dimethylphosphinic acid, phenylmethyl phosphinic acid, hypophosphorous acid, sodium hypophosphite, potassium hypophosphorous acid, lithium hypophosphorous acid, and ethyl hypophosphorous acid,

[Formula 5]



or [Formula 6]



There are a condensate of \*\*\*\*\*, such hydrolyzates, and the above-mentioned phosphinic acid compound, etc.

[0054] As a phosphonous acid compound expressed with a chemical formula (C-2), there is phenylphosphonous acid and sodium phenylphosphonous acid and potassium phenylphosphonous acid and lithium phenylphosphonous acid, ethyl phenylphosphonous acid. As a phosphonic acid compound expressed with a chemical formula (C-3), phenylphosphonic acid, There is ethylphosphonic acid, sodium phenylphosphonate, potassium phenylphosphonate, lithium phenylphosphonate, diethyl phenylphosphonate, ethylsodium-phosphonate, potassium, ethylphosphonate. As a phosphorous acid compound expressed with a chemical formula (C-4), there are phosphorous acid, sodium hydrogenphosphite, sodium phosphite, phosphorous acid triethyl, phosphorous acid triphenyl, pyrophosphorous acid, etc. Addition of the alkali compound expressed with a following chemical formula (D) found out that the thermal stability of the polyester composition of this invention improved further.

Z-OR<sub>8</sub> (D)

(however -- Z -- an alkaline metal -- R -- -- eight -- -- hydrogen -- an alkyl group -- an aryl group -- a cycloalkyl group - C -- (- O --) -- CH -- -- three -- -- or - C -- (- O --) -- OZ -- ' -- (- Z -- ' --

hydrogen and alkaline metal))

[0055]As an alkali compound expressed with a chemical formula (D). Sodium hydroxide, sodium methoxide, a sodium ethoxide, Although sodium propoxide, sodium butoxide, a potassium methoxide, a lithium methoxide, sodium acetate, sodium carbonate, an alkaline earth compound containing alkaline-earth metals, etc. are mentioned, neither is limited to these compounds.

[0056]As for content of said alkali compound in meta-xylylene group content polyamide (B) used for this invention, 1.5 to 6.0 times of phosphorus atom content (X) are preferred. They are 2.0 to 5.0 times still more preferably 1.8 to 5.5 times more preferably. If there is less content of an alkali compound than 1.5 times of phosphorus atom content (X), gelling will become easy to be promoted. On the other hand, if there is more content of an alkali compound than 6.0 times of phosphorus atom content (X), a rate of polymerization will become slow, viscosity will not especially fully go up, either, and gelling is promoted by a depressurizing system, and it is uneconomical.

[0057]Although it may use independently, since the thermal stability of said chemical formula (C-1) - (C-4) used by this invention and a compound expressed with a chemical formula (D) of a polyester composition improves, respectively, its direction used together and used especially is preferred. A publicly known antioxidant, an ultraviolet ray absorbent, a weathering agent, a flattening agent, lubricant, viscosity stabilizer, etc. may be conventionally used together besides the above-mentioned compound by a grade which does not spoil the flavor holdout of a blow molding object, and gas-barrier \*\* transparency.

[0058]In order to blend the above and a phosphorus atom content compound with meta-xylylene group content polyamide (B) used by this invention, it may add during a raw material before a polymerization of polyamide, and a polymerization, or melting mixing may be carried out at this polymer.

[0059]content of the third class nitrogen of meta-xylylene group content polyamide (B) used by this invention -- desirable -- less than 2.0 mol % -- more -- desirable -- less than 1.5 mol % -- it is less than 1.0 mol % still more preferably. A color may also worsen including a colored foreign matter-like thing according [ a Plastic solid which content of the third class nitrogen acquired using a polyester composition containing meta-xylylene group content polyamide (B) exceeding 2.0 mol % ] to a gelling thing. In an oriented film obtained by carrying out especially extension shaping, or a biaxial-stretching blow molding object, Plastic solid of a part where gelatinous material exists which becomes thick, without being extended normally, causes thickness spots, and does not have commodity value may increase in number.

[0060]As for a minimum of content of the 3rd class nitrogen, it is especially preferred from a manufacturing Reason that it is [ 0.05 mol % ] 0.01 more mol% 0.001-mol%. When content of the 3rd class nitrogen tends to manufacture meta-xylylene group content polyamide not more than 0.001 mol %, a problem may arise in productivity, like there is the necessity using a highly refined raw material which needs a deterioration prevention agent for a large quantity of keeping polymerization temperature low.

[0061]The third class nitrogen said here is both nitrogen based on an imino compound, and nitrogen based on the third class amide, and content of the third class nitrogen is the content expressed with a mole ratio (mol %) to nitrogen based on the second class amide (amide which constitutes a straight-chain-shape main chain of polyamide).

[0062]Any, such as a cylinder type, a square shape, and tabular [ spherical or flat ], may be sufficient as shape of a chip of meta-xylylene group content polyamide (B) used for this

invention. A range of the mean particle diameter is 1.0-5 mm usually 1.5-4.0 mm still more preferably 1.2-4.5 mm preferably. For example, it is practical that length is 1.0-4 mm in a cylinder type case, and a path is about 1.0-4 mm. In the case of a spherical particle, it is practical that a diameter of grain of maximum size is 1.1 to 2.0 times of mean particle diameter, and the minimum particle diameter is 0.7 or more times of mean particle diameter. Weight of a chip has the practical range of 10-30mg/piece.

[0063]1.20 - 1.24 g/cm<sup>3</sup> is preferred, and is more than 1.20 g/cm<sup>3</sup> more preferably, and density of meta-xylylene group content polyamide (B) used for this invention is below 1.23 g/cm<sup>3</sup>.

[0064]As for the mixing ratio of polyester (A) and meta-xylylene group content polyamide (B) which constitute a polyester composition of this invention, it is preferred that they are said meta-xylylene group content polyamide (B) 0.01 weight section - 100 weight sections to said polyester (A) 100 weight section. An addition of meta-xylylene group content polyamide (B) when AA content wants to acquire very few Plastic solids from the aforementioned polyester composition, 0.01 - 5 weight section is preferred to said polyester (A) 100 weight section, more desirable minimums are 0.1 weight sections, still more desirable minimums are 0.5 weight sections, more desirable maximums are four weight sections and still more desirable maximums are three weight sections.

[0065]To acquire a Plastic solid with transparency which gas barrier property is dramatically excellent in, and does not spoil practicality. Minimums with 1 - 100 weight section preferred to said polyester (A) 100 weight section and a more desirable minimum preferred to 3 weight-section pan are five weight sections, more desirable maximums are 60 weight sections and still more desirable maximums are 30 weight sections. AA content of a Plastic solid in which a mixed amount of meta-xylylene group content polyamide (B) was obtained to polyester (A) 100 weight section in the case of less than 0.01 weight sections is not reduced, but the flavor holdout of Plastic solid contents may get very bad. When a mixed amount of meta-xylylene group content polyamide (B) exceeds 100 weight sections to polyester (A) 100 weight section, the transparency of an acquired Plastic solid is very bad, and there are things, and the mechanical property of a Plastic solid may also fall.

[0066]Content of a cyclic ester trimer in a polyester composition used for this invention is 0.40 or less % of the weight still more preferably 0.45 or less % of the weight more preferably 0.50 or less % of the weight. When fabricating a heat-resistant blow molding object etc. from a polyester composition of this invention and content of a cyclic ester trimer exceeds 0.50 % of the weight, The transparency of a blow molding object etc. which were acquired by oligomer adhesion on the heating mold surface increasing rapidly depending on heat-treatment conditions may get worse dramatically.

[0067]15 ppm or less of acetaldehyde contents [ 12 ppm or less of ] in a polyester composition used for this invention are 10 ppm or less still more preferably more preferably. When an acetaldehyde content in a polyester composition of this invention exceeds 15 ppm, flavor and a smell of a drink with which a blow molding object etc. which were acquired were filled up may be affected.

[0068]5 ppm or less of formaldehyde (it may carry out abbreviated to FA hereafter) content [ 4 ppm or less of ] in a polyester composition used for this invention is 3 ppm or less still more preferably more preferably. When a formaldehyde content in a polyester composition of this invention exceeds 5 ppm, flavor and a smell of a drink with which a blow molding object etc. which were acquired were filled up may be affected.

[0069]It is desirable for an increase of stock of a cyclic ester trimer when a main repeating unit

used for this invention fuses polyester (A) which is ethylene terephthalate for 60 minutes at temperature of 290 °C to be 0.50 or less % of the weight. As for an increase of stock of a cyclic ester trimer, it is preferably desirable that it is 0.3 or less % of the weight more preferably 0.4 or less % of the weight. If an increase of stock of a cyclic ester trimer when it fuses for 60 minutes at temperature of 290 °C uses polyester exceeding 0.50 % of the weight, The transparency of a blow molding object etc. which were acquired by the amount of cyclic ester trimers increasing at the time of resin melting at the time of fabricating a polyester composition, and oligomer adhesion on the heating mold surface increasing rapidly depending on heat-treatment conditions may get worse dramatically.

[0070]Polyester (A) whose increase of stock of a cyclic ester trimer when it fuses for 60 minutes at temperature of 290 °C is 0.50 or less % of the weight and which is used for this invention can be manufactured by carrying out inactivation processing of the polycondensation catalyst which remains in polyester obtained after melt polycondensation and solid state polymerization. As a method of carrying out inactivation processing of the polycondensation catalyst in polyester, a method of carrying out contact treatment of the polyester chip to water, a steam, or a steam content gas is mentioned after melt polycondensation and solid state polymerization.

[0071]In order to attain the aforementioned purpose, how to carry out contact treatment of the polyester chip to water, a steam, or a steam content gas is described below. As a hot water disposal method, a method of soaking underwater, a method of pouring water on a chip in a shower, etc. are mentioned. For 5 minutes - two days, for 10 minutes - one day, it is 30 minutes - 10 hours still more preferably, and 40-150 °C 20-180 °C is 50-120 °C still more preferably preferably as a temperature of water as processing time. Even if disposal methods are any of a continuous method and a batch method, it does not interfere, but the continuous method is more preferred in order to carry out industrially.

[0072]When carrying out water treatment of the chip of polyester with a batch method, a silo type processing tub is mentioned. That is, a chip of polyester is accepted in a silo with a batch method, and water treatment is performed. When carrying out water treatment of the chip of polyester with a continuous method, water treatment of the chip of polyester can be accepted and carried out to a tower type processing tub from the upper part continuously or intermittently.

[0073]When contacting a chip, a steam, or steam containing gas of polyester and processing it, Preferably a steam, steam containing gas, or steam content air with a temperature of 50-110 °C 50-150 °C Per 1 kg of granular polyethylene terephthalate, Make it supply in quantity of 0.5g or more as a steam, or it is made to exist, and granular polyethylene terephthalate and a steam are contacted. Contact with a chip of this polyester and a steam is usually preferably performed for 10 minutes - for two days for for 20 minutes to 10 hours.

[0074]Even if disposal methods are any of a continuous method and a batch method, they do not interfere. In a chip of polyester, when carrying out a steam and contact treatment with a batch method, a silo type processing unit is mentioned. That is, a chip of polyester is accepted in a silo, with a batch method, a steam or steam containing gas is supplied and contact treatment is performed.

[0075]When carrying out contact treatment of the chip of polyester to a steam continuously, granular polyethylene terephthalate can be continuously accepted in a tower type processing unit from the upper part, continuous supply of the steam can be carried out by parallel flow or a counterflow, and contact treatment can be carried out to a steam. When it processes with water or a steam like the above, it drains off water from granular polyethylene terephthalate with water drip devices, such as a vibrating screen machine and Simon Carter, if needed, and transports to

the following drying process by conveyor.

[0076]The desiccation of a chip of polyester which carried out contact treatment to water or a steam can use a drying process of polyester usually used. As a method of drying continuously, a chip of polyester is supplied from the upper part and normal use of the hopper type through-gas dryer which aerates a dry gas from the lower part is carried out.

[0077]It may dry aerating a dry gas under atmospheric pressure as a dryer dried with a batch method. Although atmospheric air does not interfere as a dry gas, either, dry nitrogen from a point which prevents a molecular weight fall by hydrolysis and thermal oxidation decomposition of polyester, and dehumidified air are preferred.

[0078]Polyester (A) which is used for this invention and whose main repeating unit is ethylene terephthalate, It can be polyester which blends at least 0.1 ppb - 1000 ppm of a kind of resin chosen from a group which consists of polyolefin resin, polyamide resin, polyacetal resin, and polybutyrene terephthalate resin, and is characterized by things. 0.1 ppb - 1000 ppm of blending ratios [ 0.3 ppb - 100 ppm of / 0.5 ppb - 1 ppm of ], such as the aforementioned polyolefin resin in inside of polyester (A) used for this invention, are 0.5 ppb - 45ppb still more preferably more preferably.

[0079]Since a crystallization rate becomes very slow and it becomes insufficient crystallizing it of a stopper part of a blow molding object, when loadings are less than 0.1 ppb. Since a shrinkage amount of a stopper part will not fall within a default value range if cycle time is shortened, capping may become poor, or, When dirt of an extension heat setting metallic mold which fabricates a heat-resistant blow molding object is intense and it is going to acquire a transparent blow molding object, metallic mold cleaning may have to be carried out frequently. When exceeding 1000 ppm, it becomes excessive early crystallizing a crystallization rate of a stopper part of a blow molding object, or. For this reason, since a contraction shrinkage amount of a stopper part does not fall within a default value range, capping becomes poor, leakage of contents may arise, and a preforming object for hollow Plastic solids may milk, and, for this reason, normal extension may become impossible. In the case of a sheet like object, if 1000 ppm is exceeded, transparency will get very bad, and ductility also worsens, and only a bad oriented film of transparency with normal impossible extension and big thickness spots may be obtained.

[0080]As polyolefin resin blended with polyester (A) used for this invention, polyethylene system resin, a polypropylene resin, or alpha olefin system resin is mentioned.

[0081]As polyethylene system resin blended with polyester (A) used for this invention, For example, other with a carbon number of about two to 20 of a homopolymer of ethylene, ethylene, propylene and butene-1, the 3-methylbutene 1, the pentene- 1, 4-methylpentene- 1, the hexene- 1, the octene- 1, and decene 1 grade alpha olefins, and vinyl acetate, VCM/PVC, A copolymer with vinyl compounds, such as acrylic acid, methacrylic acid, acrylic ester, methacrylic acid ester, and styrene, etc. are mentioned. Specifically, for example Ethylene homopolymers, such as low, inside, and high density polyethylene (branched state or straight chain shape). Ethylene propylene rubber, an ethylene-butene-1 copolymer, ethylene-4-methylpentene-1 copolymer, Ethylene resin, such as ethylene-hexene-1 copolymer, ethylene-octene-1 copolymer, an ethylene-vinylacetate copolymer, an ethylene-acrylic acid copolymer, an ethylene-methacrylic acid copolymer, and an ethylene-ethyl acrylate copolymer, is mentioned.

[0082]As a polypropylene resin blended with polyester (A) used for this invention, For example, other with a carbon number of about two to 20 of a homopolymer of propylene, propylene, ethylene and butene-1, the 3-methylbutene 1, the pentene- 1, 4-methylpentene- 1, the hexene- 1, the octene- 1, and decene 1 grade alpha olefins, and vinyl acetate, VCM/PVC, A copolymer with

vinyl compounds, such as acrylic acid, methacrylic acid, acrylic ester, methacrylic acid ester, and styrene, etc. are mentioned. Specifically, propylene resin, such as a BUROPIREN homopolymer, a propylene-ethylene copolymer, and a propylene-ethylene-butene-1 copolymer, is mentioned, for example.

[0083]As alpha olefin system resin blended with polyester (A) used for this invention,

Homopolymers of with a carbon number of about two to eight of 4-methylpentene-1 grade alpha olefin, and those alpha olefins, A copolymer with other with a carbon number of about two to 20 of ethylene, propylene, butene-1, the 3-methylbutene 1, the pentene- 1, the hexene- 1, the octene- 1, and decene 1 grade alpha olefins, etc. are mentioned. Specifically, butene-1 system resin, such as a butene-1 homopolymer, 4-methylpentene-1 homopolymer, a butene-1-ethylene copolymer, and a butene-1-propylene copolymer, a copolymer of 4-methylpentene- 1 and alpha olefin of C2-C18, etc. are mentioned, for example.

[0084]As polyamide resin blended with polyester (A) used for this invention, For example, a butyrolactam, delta-valerolactam, epsilon caprolactam, A polymer of lactam, such as ENANTO lactam and omega-RAURO lactam, 6-aminocaproic acid, A polymer of aminocarboxylic acid, such as 11-aminoundecanoic acid and 12-amino dodecanoic acid, Hexamethylenediamine, nonamethylene diamine, decamethylene diamine, Aliphatic diamine, such as dodecamethylenediamine, undecamethylene diamine, 2,2,4-, or 2,4,4-trimethyl hexamethylenediamine, Diamine units, such as aromatic diamine, such as alicyclic diamine [ , such as 1,3- or 1,4-bis(aminomethyl)cyclohexane, and a screw (p-aminocyclohexyl methane) ], m-, or p-xylylene diamine, Aliphatic dicarboxylic acid, such as glutaric acid, adipic acid, suberic acid, and sebacic acid, Polycondensation bodies with a dicarboxylic acid unit of aromatic dicarboxylic acid, such as alicyclic dicarboxylic acid, such as cyclohexanedicarboxylic acid, terephthalic acid, and isophthalic acid, etc., these copolymers, etc. are mentioned, and specifically, for example The nylon 4, nylon 6, the nylon 7, the nylon 8, the nylon 9, Nylon 11, Nylon 12, Nylon 66, the nylon 69, the nylon 610, the nylon 611, Nylon 612, the nylon 6 T. The nylon 6 I, Nylon MXD 6, nylon 6 /66, nylon 6/610, nylon 6/12, nylon 6 /6T, and nylon 6 I / 6T grade are mentioned.

[0085]As polyacetal resin blended with polyester (A) used for this invention, a polyacetal homopolymer and a copolymer are mentioned, for example. As a polyacetal homopolymer, density measured with a measuring method of ASTM-D792 with a measuring method of 1.40-1.42g/cm<sup>3</sup> and ASTMD-1238. Polyacetal of a range for 0.5-50g/10 minutes has a preferred melt index (MI) measured by 190 \*\* and 2160 g of load.

[0086]As a polyacetal copolymer, density measured with a measuring method of ASTM-D792 with a measuring method of 1.38-1.43g/cm<sup>3</sup> and ASTMD-1238. A polyacetal copolymer of a range for 0.4-50g/10 minutes has a preferred melt index (MI) measured by 190 \*\* and 2160 g of load. Ethyleneoxide and cyclic ether are mentioned as these copolymer components.

[0087]it is blended with polyester (A) used for this invention -- it coming out and as polybutyrene terephthalate resin. For example, a copolymer which carried out copolymerization of the naphthalene-dicarboxylic acid, diethylene glycol, 1, and 4-cyclohexane dimethanol etc. to a polybutylene terephthalate homopolymer which consists of terephthalic acid and 1,4-butanediol, or this is mentioned.

[0088]Polyester which blended the aforementioned polyolefin resin etc. which are used in this invention, How to add directly and carry out melt kneading of the resin, such as the aforementioned polyolefine, to said polyester so that the content may serve as said range, Or it is based on a method of common use of a method of adding as a masterbatch and carrying out melt



kneading, etc., and also. Resin, such as the aforementioned polyolefine, a manufacturing stage of said polyester. At the time of melt polycondensation, immediately after melt polycondensation and preliminary crystallization at the time of solid state polymerization For example, ones immediately after solid state polymerization etc. of stages, Or after adding directly as a particulate matter after finishing a manufacturing stage before resulting in a molding step, or making it mix by a method of making a member made of resin, such as the aforementioned polyolefine, contact etc. under a plastic flow condition of a polyester chip, it can also be based on a method of carrying out melt kneading, etc.

[0089]As a method of making a member made of resin, such as the aforementioned polyolefine, contacting, here a polyester chip-like object under a plastic flow condition, Within \*\*\*\* in which a member made of resin, such as the aforementioned polyolefine, exists, it is [ a polyester chip ] preferred to carry out contact collision to this member, and it specifically, At for example, the time of a manufacturing process immediately after melt polycondensation of polyester, preliminary crystallization, and solid state polymerization etc. At the time of shipping cask restoration and discharge in a transportation stage as a product of a polyester chip, etc. Energy transport piping in the time of a making machine injection by a molding step of a polyester chip, etc., . [ whether parts of a magnet board of gravity transport piping, a silo, and a magnet catcher, etc. are made into products made of resin, such as the aforementioned polyolefine, and ] Or resin, such as the aforementioned polyolefine. is lined, or members made of resin, such as the aforementioned polyolefines, such as rod form or a reticulum, are installed in said transportation route, and a method of transporting a polyester chip is mentioned. Although contact time with said member of a polyester chip is the ultrashort time amount for 0.01 second - about several minutes, it can make a small amount of resin, such as the aforementioned polyolefine, usually mix in polyester.

[0090]A main repeating unit an acetaldehyde content of polyester (A) which is ethylene terephthalate used for this invention 10 ppm or less, It is more preferably desirable [ 4 ppm or less and a formaldehyde content ] still more preferably that it is 4 ppm or less 5 ppm or less 6 ppm or less 6 ppm or less 8 ppm or less. When an acetaldehyde content exceeds 10 ppm and a formaldehyde content exceeds 6 ppm, an effect of the flavor holdout of contents, such as a Plastic solid fabricated from this polyester, worsens. As for a minimum of the amount of acetaldehyde, and the amount of formaldehyde, it is preferred that it is 0.1 ppb.

[0091]a minimum of a glycol component from which the amount of diethylene glycol by which copolymerization was carried out into polyester (A) which is used for this invention, and whose main repeating unit is ethylene terephthalate constitutes said polyester (A) -- desirable -- 1.0-mol % -- more -- desirable -- 1.3-mol %. it is 1.5-mol % still more preferably -- a maximum -- desirable -- 5.0-mol % -- more -- desirable -- 4.5-mol % -- it is 4.0-mol % still more preferably. When the amount of diethylene glycol exceeds 5.0-mol %, thermal stability worsens and a molecular weight fall does not become large at the time of molding, and an increase of stock of an acetaldehyde content or a formaldehyde content may become large, and it is not desirable. When diethylene glycol content is less than [ 1.0 mol % ], the transparency of an acquired Plastic solid may worsen.

[0092]A polyester composition of this invention can be conventionally obtained by the ability to mix the aforementioned meta-xylylene group content polyamide (B) with the aforementioned polyester (A) by a publicly known method. The aforementioned polyamide chips and the aforementioned polyester chip For example, a tumbler, What carried out the dry blend with a V type blender, a Henschel mixer, etc., What carried out melting mixing of the mixture which

furthermore carried out the dry blend once or more by 1 axis extrusion machine, twin screw extruder, a kneader, etc., a thing which carried out solid state polymerization of the molten mixture under a high vacuum or an inert gas atmosphere if needed further, etc. are mentioned. What carried out the dry blend of what carried out melting mixing of the aforementioned polyester (A) and the aforementioned meta-xylylene group content polyamide (B) beforehand to the aforementioned polyester (A), and a thing which carried out melting mixing of the mixture which carried out the dry blend further are mentioned.

[0093]It is also possible to use together simultaneously saturated fatty acid monoamide, unsaturated fatty acid monoamide, saturated fatty acid bisamide, unsaturated fatty acid bisamide, etc. to a polyester composition of this invention.

[0094]As an example of saturated fatty acid monoamide, lauric acid amide, pulmitic acid amide, octadecanamide, behenic acid amide, etc. are mentioned. As an example of unsaturated fatty acid monoamide, oleic amide, erucic acid amide, ricinoleic acid amide, etc. are mentioned. As an example of saturated fatty acid bisamide, methylenebis octadecanamide, ethylenebis capric acid amide, ethylenebis lauric acid amide, ethylenebis octadecanamide, ethylenebis behenic acid amide, hexa methylenebis octadecanamide, hexa methylenebis behenic acid amide, etc. are mentioned. As an example of unsaturated fatty acid bisamide, ethylenebis oleic amide, hexa methylenebis oleic amide, etc. are mentioned. Desirable amide system compounds are saturated fatty acid bisamide, unsaturated fatty acid bisamide, etc. As for loadings of such an amide compound, it is preferred that it is the range of 10 ppb -  $1 \times 10^5$  ppm.

[0095]A metal salt compound of aliphatic monocarboxylic acid of the carbon numbers 8-33, for example, naphthenic acid, Caprylic acid, capric acid, lauric acid, myristic acid, pulmitic acid, It is also possible to use together simultaneously saturation, such as stearic acid, behenic acid, montanic acid, melissic acid, oleic acid, and linolic acid, and a lithium salt of unsaturated fatty acid, sodium salt, potassium salt, magnesium salt, calcium salt, cobalt salt, etc. As for loadings of these compounds, it is preferred that it is the range of 10 ppb - 300 ppm.

[0096]Various kinds of additive agents, such as other additive agents, for example, a publicly known ultraviolet ray absorbent, an antioxidant, an oxygen absorbent, an oxygen trapping agent, lubricant added from the exterior and lubricant which carried out the internal deposit during a reaction, a release agent, a nucleating additive, stabilizer, a spray for preventing static electricity, and paints, may be blended with a polyester composition of this invention if needed. It is also possible to mix a recovery article from ultraviolet-rays interception nature resin, heat resistant resin, and a used polyethylene terephthalate bottle, etc. at a suitable rate.

[0097]A faint yellow color which water-white resin generates between melting processings in a desirable use can be erased by addition of blue colorant. Colorant can be directly added to mixed material between polymerizations or between combination. When added between combination, it can also add as it is and colorant can also be added as concentrates, such as a masterbatch. Quantity of colorant can be adjusted to a color desirable for the absorbancy index and its use. As desirable colorant, 1-cyano 6-(4-(2-hydroxyethyl) anilino)-3-methyl-3H-dibenzo (F,I,J)-isoquinoline 2,7-dione is mentioned. As for an addition of colorant, it is preferred that it is the range of 2-15 ppm.

[0098]In using a polyester composition of this invention for a film application, In order to improve handlability, such as slide nature, volume nature, and blocking resistance. In a polyester composition, calcium carbonate, magnesium carbonate, barium carbonate, Calcium sulfate, barium sulfate, lithium phosphate, calcium phosphate, Inorganic particles, such as magnesium phosphate, a calcium oxalate and calcium, barium, A vinyl system monomer of organic salt

particles and divinylbenzenes, such as terephthalic acid salt, such as zinc, manganese, and magnesium, styrene, acrylic acid, methacrylic acid, acrylic acid, or methacrylic acid can be independent, or inert particles, such as crosslinked polymer particles, such as a copolymer, can be made to contain.

[0099]The polyester composition of this invention can fabricate a film, a sheet, a container, and other wrapping using a melt molding method generally used. In injection molding or a sheet like object produced by carrying out extrusion molding, an oriented film which consists of a polyester composition of this invention is fabricated using uniaxial stretching and extension methods arbitrary [ of biaxial stretching and the simultaneous biaxial stretching ] one by one which are usually used for extension of PET. It can also fabricate cup shape and in the shape of a tray with pressure forming and vacuum forming.

[0100]In manufacturing an oriented film, extension temperature is usually 80-130 \*\*. Although one axis or two axes may be sufficient as extension, it is biaxial stretching from a point of film practical use physical properties preferably. If draw magnification is a case of one axis, it will usually be preferably performed in the 1.5 to 8 times as many ranges 1.1 to 10 times, and if it is biaxial stretching, it should just usually perform a lengthwise direction and a transverse direction in the 1.5 to 5 times as many ranges preferably 1.1 to 8 times, respectively. depth magnification / transverse direction magnification -- usually -- 0.5-2 -- it is 0.7-1.3 preferably. Heat setting of the obtained oriented film can be carried out further, and it can also improve heat resistance and a mechanical strength. heat setting -- usually -- the bottom of stress, and 120\*\*-240 -- it is 150-230 \*\* preferably, and is usually preferably carried out for [ tens of seconds - ] several minutes for several seconds - several hours.

[0101]In manufacturing a blow molding object, it becomes impossible to carry out stretch blow molding of the yellowtail form fabricated from PET of this invention, and a device conventionally used by blow molding of PET can be used. Preforming is specifically fabricated by injection molding or extrusion molding once, it is reheated after processing remaining as it is or a stopper part, and a pars basilaris ossis occipitalis, and biaxial-stretching-blow-molding methods, such as the hot parison method or a cold parison process, are applied. A range of each part of a cylinder of a making machine and temperature of a nozzle is usually 260-290 \*\* at molding temperature in this case, and a concrete target. It is 90-110 \*\* preferably, and draw magnification is performed to a lengthwise direction by 1.5 to 3.5 times, and 70-120 \*\* of extension temperature \*\*\*\*\* should just usually perform it to a circumferencial direction in the 2 to 5 times as many ranges. Although it can be used as it is, an acquired blow molding object performs heat setting processing within a blow mold further, and it is generally [ in the case of a drink which needs heat restoration like especially a fruit-juice drink and oolong tea ] used for it for heat resistance, giving. Under stress by a compressed air etc., heat setting is 120-180 \*\* preferably, and is usually preferably performed for [ several seconds - ] several minutes 100-200 \*\* for several seconds - several hours.

[0102]In order to give heat resistance to a stopper part, a stopper part of preforming obtained by injection molding or extrusion molding is crystallized within far-infrared rays or near infrared heater installation oven, or a stopper part is crystallized with the aforementioned heater after bottle shaping.

[0103]A polyester composition of this invention can be used also as 1 composition layers, such as a laminate-molding object and a laminated film. In particular, it is used for manufacture of a container etc. in a form of a layered product with PET. A Plastic solid of the two-layer structure which comprises a bilayer of an inner layer and a PET outer layer which consist of a polyester

composition of the two-layer structure which comprises a bilayer of an outer layer and a PET inner layer which consist of a polyester composition of this invention as an example of a laminate-molding object, or this invention, A Plastic solid of three layer systems which comprise an outer layer and an innermost layer containing a polyester composition of three layer systems which comprise an interlayer, an outer layer of PET, and an innermost layer containing a polyester composition of this invention, or this invention, and an interlayer of PET, A Plastic solid etc. of five layer systems which comprise an interlayer, an innermost layer of PET, a central layer, and an innermost layer containing a polyester composition of this invention are mentioned. Mixed use of the recovery article from other gas-barrier resin, ultraviolet-rays interception nature resin, heat resistant resin, and a used polyethylene terephthalate bottle, etc. can be carried out at a suitable rate at a PET layer.

[0104]As an example of other laminate-molding objects, a laminate-molding object with substrates of a different kind, such as a laminate-molding object with resin other than polyester, such as polyolefine, paper, and a metal plate, is mentioned. There is no restriction in particular in thickness of the aforementioned laminate-molding object, and thickness of each class. In the aforementioned laminate-molding object, it is usable with various shape, such as a sheet like object, a film state thing, a board-shaped object, a hollow body, and a container.

[0105]A co-extrusion can also perform manufacture of the aforementioned layered product using an extrusion machine and a multilayer variety dice of a number corresponding to a kind of resin layer, and co-injection can also perform using a catapult, a co-injection runner, and an ejected type of a number corresponding to a kind of resin layer. A polyester composition of this invention can be preferably used as packing materials, such as a blow molding object, a tray, and a biaxially oriented film, a film for metal-can covering, etc. A constituent of this invention can be used also for a use of a tray shaped container for cooking foodstuff's with a microwave oven, a microwave oven, etc., or heating frozen foods. In this case, after fabricating a sheet like object from a polyester composition to tray shape, thermal crystallization is carried out and heat resistance is raised. A measuring method of the main weighted solidity in this invention is explained below.

[0106]

[Example]Although working example explains this invention concretely below, this invention is not made to limit to these working example. The measuring method of the main weighted solidity in this Description is explained below.

[0107](Valuation method)

(1) Limiting viscosity (IV) of polyester

It asked from the solution viscosity in 30 \*\* among 1,1,2,2-tetrachloroethane / phenol (2:3 weight ratios) mixed solvent.

[0108](2) Diethylene glycol content by which copolymerization was carried out into polyester (henceforth [DEG content])

Methanol decomposed, the amount of DEG(s) was quantified with gas chromatography, and it expressed with the rate (Mol %) over a total glycol component.

[0109](3) Content of a cyclic ester trimer (henceforth "CT content")

300 mg of samples are dissolved in 3 ml of hexafluoro isopropanol / chloroform mixed liquor (capacity factor = 2/3), and 30 ml of chloroform is added and diluted further. It filters, after adding 15 ml of methanol to this and settling polymer. Under [ a fixed quantity / liquid chromatography / high-speed / trimer / cyclic ester / it evaporates filtrate to dryness, and it considers it as constant volume by 10 ml of dimethylformamide and ].

[0110](4) An acetaldehyde content (henceforth "AA content"), a formaldehyde content (henceforth "FA content")

A sample/distilled water = the upper part which put 1 g/2cc into the glass ampul which carried out the nitrogen purge was heat-sealed, extracting processing was performed at 160 °C for 2 hours, the acetaldehyde and formaldehyde in an after-cooling extract were measured with high sensitivity gas chromatography, and concentration was displayed in ppm. When a sample was a bottle, the bottle body was cut off, and what was cut to about 3 mm squares was used.

[0111](5) The cyclic ester trimer increase of stock at the time of melting of polyester (the amount of %CTs)

3 g of dry polyester chips are put into glass test tubes, under a nitrogen atmosphere, you make it immersed in a 290 °C oil bath for 60 minutes, and melting is carried out to it. The cyclic ester trimer increase of stock at the time of melting is calculated with a following formula.

The cyclic ester trimer increase of stock at the time of melting (% of the weight) = cyclic ester trimer content before cyclic ester trimer content (% of the weight)-melting after melting (% of the weight)

[0112](6) The weight average molecular weight (Mw) of meta-xylylene group content polyamide, a number average molecular weight (Mn)

What dissolved the sample in the hexafluoro isopropanol (HFIP) in which sodium trifluoroacetate was dissolved by the concentration of 10mM by the concentration of 2mg/ml was used as the measurement solution, and it measured with gel osmosis type chromatography (GPC). It used [ TSKgel Super AWM-H(6.0mmIDx15cm, TOSOH CORP. make) x2 ] for the measuring device at HLC-8220 by TOSOH CORP., and a column. It measured on condition of injection-rate 20microl, the column temperature of 40 °C, and rate-of-flow 0.3 ml/min using HFIP which contains sodium trifluoroacetate of the same presentation as the above in a mobile phase. Calculation of weight average molecular weight, a number average molecular weight, and molecular weight distribution was computed by PMMA conversion using standard poly methyl methacrylate (PMMA). Under the present circumstances, in baseline setting out of the polymer component peak from the obtained chromatogram, it was set as the retention time of PMMA of the molecular weight 1680 which measured the terminal point of the baseline on the conditions.

[0113](7) Sodium atom content in meta-xylylene group content polyamide (henceforth "Na content")

An incinerated part understands a sample with a platinum crucible, and 6 mol/L chloride is added and it evaporates to dryness. It dissolved with 1.2 mol/L chloride, and quantified and asked by atomic absorption.

[0114](8) Relative viscosity (RV) of meta-xylylene group content polyamide

0.25 g of samples were dissolved in 25 ml of sulfuric acid 96%, and it asked for 10 ml of this solution from measurement and a lower type at 20 °C with the Ostwald viscosity pipe.

$RV = \frac{t_0}{t_s}$  -- number of fall seconds t: of a solvent -- the number of fall seconds of the sample solution [0115](9) Terminal amino group concentration of meta-xylylene group content polyamide (AEG, μmol/g)

After dissolving 0.5 g of samples in 50 ml of phenol / ethanol mixed solvents (volume ratios 4/1) at a room temperature, 20 ml of water / ethanol mixed solvents (volume ratios 3/2) are added and agitated. Then, the neutralization titration was performed using chloride and it asked for terminal amino group concentration.

[0116](10) Terminal carboxyl group concentration of meta-xylylene group content polyamide (CEG, μmol/g)

20 ml of benzyl alcohol was added to 0.5 g of samples, the heating and dissolving back was performed in a 170-180 °C oil bath, sodium hydroxide solution performed the neutralization titration, and it asked for terminal carboxyl group concentration.

[0117](11) Move the polyester composition which carried out stopper part crystallization desiccation to the hopper dryer which set empty atmospheric temperature as 130 °C, and supply an injection molding machine. 280 °C and a screw speed for the temperature of each part of a cylinder, and a nozzle head 120 rpm, Back pressure for 1.0 second for primary-pressure-of-reducing-valve time for 18 seconds for 12 seconds 5kg/cm<sup>2</sup>, [ ejection time ] [ cool time ] Product weight is 60g (165 mm in length.) with the injection molding machine (Meiki M-150C (DM)) which set the degree of die cooling water temperature as 20 °C. With the diameter of stopper circles of 22 mm, the stopper part thickness of 2 mm, and a drum section thickness of 3.7 mm preforming for 1.5L bottles is fabricated, It adjusts so that the temperature near the preforming stopper part may be 180 °C with a near-infrared quartz heater, The mold pin with an outer diameter of 21.8 mm was inserted to the turnip lower, stopper part crystallization treatment was performed, and the stopper part crystallizing device estimated the density of a stopper part top panel screw thread starting position, and the height from a top panel to a support ring, after heating for 90 seconds, rotating preforming.

[0118](12) Density measurement density created the density gradient tube (density ranges 1.28-1.42) in which pure water was made to dissolve a calcium nitrate, and measured it with the value of after-injection 2 hours at the temperature of 30 °C.

[0119](13) Biaxial stretching blow molding of the preforming which carried out heating crystallization was carried out using the product LB[ made by condominium PURASUTO ]-01E extension blow molding machine by the method of the evaluation above (11) of metallic mold dirt, heat setting was carried out for about 7 seconds within the metallic mold succeeding set as about 145 °C, and a 1000-cc blow molding object was acquired. Stretch blow molding of the 2000 blow molding objects was carried out continuously, the state on the surface of a metallic mold before and behind that was observed visually, and the same conditions estimated it as follows.

O : In continuous molding examination order, it is change-less °C . : There are dramatically quite many affixes after x:continuous molding examination with an affix after a continuous molding examination. [0120](14) The distilled water which the blow molding object of the organoleptics above was made to boil was put in, and it held after sealing for 30 minutes, and it cooled to the room temperature, and allowed to stand for one month at the room temperature, and after-stopping flavor, a smell, etc. were examined. Distilled water is used as blank [ for comparison ]. By ten persons' panelist, organoleptics were carried out by the following standard and compared by average value.

(Valuation basis)

0: 4 which senses a remarkable difference with 3:blank which senses a difference with 2:blank which senses small a difference with 1:blank which does not feel the different taste and a smell : a very big difference with a blank is sensed. [0121](Polyethylene terephthalate (PET) used for working example and a comparative example) The characteristic of PET (germanium ullage = about 40-50 ppm, L.ynn ullage = about 30-35 ppm) used for the examination is shown in Table 1. These all polymerize with a continuation melt polycondensation-solid-state-polymerization device. PET (a) carries out hot water processing at about 90 °C in the ion exchange water after solid state polymerization for 3 hours. All the DEG content of PET (a) - PET (b) is about 2.7-mol %.

[0122]

[Table 1]

	IV (dl/g)	AA 含有量 (ppm)	CT 含有量 (重量%)	ΔCT 量 (重量%)
PET(a)	0.74	2.4	0.31	0.04
PET(b)	0.74	3.4	0.40	0.52

[0123](Meta-xylylene group content polyamide used for working example and a comparative example (MXD6))

[0124]27.66 kg of meta-xylylene diamine and 29.65 kg of adipic acid which were weighed precisely with preparation cans with a provided with the manufacturing method agitator, the dephlegmator, the thermometer, dropping funnel, and nitrogen gas introducing pipe of MXD6 (c) content volume of 250 l. were prepared with the internal temperature of 85 \*\*, and it was considered as the solution with transparent slurry form. After preparing PH value in a can to 7.98, NaOH 34.09g, and NaH<sub>2</sub>PO<sub>4</sub> and H<sub>2</sub>O 25.81g were supplied as a terminal stopper, and it stirred for 15 minutes. The solution was transported to the reacting can with a content volume of 270 l., and it was made to stir and react under the conditions of the degree of can internal temperature of 260 \*\*, and can internal pressure 1.0MPa. When the water to distill was removed out of the system and the degree of can internal temperature became 235 \*\*, it returned to ordinary pressure, having applied can internal pressure for 60 minutes. It stirred by ordinary pressure, when target viscosity was reached, stirring was stopped, and it was neglected for 20 minutes. Then, cooling solidification of the melting resin was taken out and carried out from the output port of the reacting can lower part, and resin tips were obtained with the strand cutter. The characteristic of the obtained resin is shown in Table 2.

[0125]Resin tips were obtained like the manufacturing method of MXD6 (c) except having adjusted PH value in the manufacturing method can of MXD6 (d) to 7.02. The characteristic of the obtained resin is shown in Table 2.

[0126]Resin tips were obtained like the manufacturing method of MXD6 (c) except having prepared PH value in the manufacturing method can of MXD6 (e) to 6.92. The characteristic of the obtained resin is shown in Table 2.

[0127]

[Table 2]

	RV	Mw	Mn	Mw/Mn	AE G (μmol/g)	CE G (μmol/g)	AE G/ CE G	Na 含有量 (ppm)
MXD6 (c)	1.8	35000	19000	1.8	185	35	5.3	410
MXD6 (d)	2.1	51000	24000	2.1	106	40	2.7	410
MXD6 (e)	2.1	56000	20000	2.8	56	105	0.5	410

[0128](Working example 1) The method of the valuation method (11) estimated the stopper part density of preforming, and a size using MXD6(c)1.0 weight section to PET(a)100 weight section. The blow molding object was fabricated by the method of the valuation method (13), and CT content of the Plastic solid and AA content were measured. Metallic mold dirt evaluation was also performed. The characteristic and the metallic mold dirt evaluation result of a blow molding object which were obtained are shown in Table 3. AA content of the blow molding object of 8 ppm and FA content was [ 0.7 and appearance ] transparent in the range with practical 1 ppm and organoleptics evaluation. Stopper part density was high enough, and the stopper part crystallization treatment which was stabilized small as for the variation in a size was possible. Metallic mold dirt was not accepted.

[0129](Working example 2) The method of the valuation method (11) estimated the stopper part density of preforming, and a size using MXD6(c)5.0 weight section to PET(a)100 weight section. The blow molding object was fabricated by the method of the valuation method (13), and CT content of the Plastic solid and AA content were measured. Metallic mold dirt evaluation was also performed. The characteristic and the metallic mold dirt evaluation result of a blow molding object which were obtained are shown in Table 3. AA content of the blow molding object of 6 ppm and FA content was [ 0.6 and appearance ] transparent in the range with practical 0.5 ppm and organoleptics evaluation. Stopper part density was high enough, and the stopper part crystallization treatment which was stabilized small as for the variation in a size was possible. Metallic mold dirt was not accepted.

[0130](Working example 3) The method of the valuation method (11) estimated the stopper part density of preforming, and a size using MXD6(d)3.0 weight section to PET(a)100 weight section. The blow molding object was fabricated by the method of the valuation method (13), and CT content of the Plastic solid and AA content were measured. Metallic mold dirt evaluation was also performed. The characteristic and the metallic mold dirt evaluation result of a blow molding object which were obtained are shown in Table 3. AA content of the blow molding object of 9 ppm and FA content was [ 0.7 and appearance ] transparent in the range with practical 1 ppm and organoleptics evaluation. Stopper part density was high enough, and the stopper part crystallization treatment which was stabilized small as for the variation in a size was possible. Metallic mold dirt was not accepted.

[0131](Comparative example 1) The method of the valuation method (11) estimated the stopper part density of preforming, and a size using MXD6(e)1.0 weight section to PET(a)100 weight section. The blow molding object was fabricated by the method of the valuation method (13), and CT content of the Plastic solid and AA content were measured. Metallic mold dirt evaluation was also performed. The characteristic and the metallic mold dirt evaluation result of a blow molding object which were obtained are shown in Table 3. Although the appearance of a blow molding object is transparent in the practical range and metallic mold dirt was not accepted, either, AA content of 18 ppm and FA content was as high as 7 ppm, and organoleptics evaluation had a difference of 2.2 and blank distilled water. Although stopper part density was high enough, variation was large and variation of the dimensional change was large.

[0132](Comparative example 2) The method of the valuation method (11) estimated the stopper part density of preforming, and a size using MXD6(e)5.0 weight section to PET(a)100 weight section. The blow molding object was fabricated by the method of the valuation method (13), and CT content of the Plastic solid and AA content were measured. Metallic mold dirt evaluation was also performed. The characteristic and the metallic mold dirt evaluation result of a blow molding object which were obtained are shown in Table 3. Although the appearance of a blow molding object is transparent in the practical range and metallic mold dirt was not accepted, either, AA content of 16 ppm and FA content was as high as 6 ppm, and organoleptics evaluation had a difference of 2.4 and blank distilled water. Although stopper part density was high enough, variation was large and variation of the dimensional change was large.

[0133](Comparative example 3) The method of the valuation method (11) estimated the stopper part density of preforming, and a size using MXD6(e)1.0 weight section to PET(b)100 weight section. The blow molding object was fabricated by the method of the valuation method (13), and CT content of the Plastic solid and AA content were measured. Metallic mold dirt evaluation was also performed. The characteristic and the metallic mold dirt evaluation result of a blow molding object which were obtained are shown in Table 3. 20 ppm and FA content of AA



content were as high as 7 ppm, and organoleptics evaluation had a difference of 2.7 and blank distilled water. Although stopper part density was high enough, variation was large and variation of the dimensional change was large. As for metallic mold dirt, the affix was accepted considerably and cloudy weather was looked at by the appearance of the blow molding object. [0134](Comparative example 4) The method of the valuation method (11) estimated the stopper part density of preforming, and a size using PET (a). The blow molding object was fabricated by the method of the valuation method (13), and CT content of the Plastic solid, AA content, and FA content were measured. Metallic mold dirt evaluation was also performed. The characteristic and the metallic mold dirt evaluation result of a blow molding object which were obtained are shown in Table 3.

[0135]

[Table 3]

項目	実施例 1	実施例 2	実施例 3	比較例 1	比較例 2	比較例 3	比較例 4
ポリエス テル 組成物	PET(a) (重量部)	100	100	100	100		100
	PET(b) (重量部)					100	
	MXD6(c)	1.0	5.0				
	MXD6(d)			3.0			
	MXD6(e)				1.0	5.0	1.0
	MXD6(f)						
中 空 成 形 体	CT含有量 (重量%)	0.35	0.30	0.32	0.36	0.35	0.84
	AA含有量 (ppm)	8	6	9	18	16	20
	FA含有量 (ppm)	1	0.5	1	7	6	7
	金型汚れ	○	○	○	○	○	×
	口栓部密度 (g/cm <sup>3</sup> )	1.378	1.383	1.381	1.376	1.382	1.378
	口栓部密度偏差	0.001	0.002	0.001	0.010	0.015	0.010
	口栓部高さ偏差 (mm)	0.03	0.03	0.03	0.20	0.24	0.21
	官能試験	0.7	0.6	0.7	2.2	2.4	2.7

[0136]

[Effect of the Invention]According to the polyester composition of this invention, a blow molding object, a sheet like object, and an oriented film excellent in flavor holdout are obtained. When manufacturing a blow molding object furthermore, the Plastic solid of the quality which does not have variation in the degree of crystallinity or size after stopper part crystallization, and was stabilized can be acquired.

[Translation done.]